The American Journal of Medical Technology

MAY, 1945

Vol. 11, No. 3

OFFICIAL PUBLICATION

AMERICAN SOCIETY OF MEDICAL TECHNOLOGISTS
Published Bi-Monthly by The American Society of Medical Technologists
Printed by The Wines Printing Company
Business Office: Medical Center Bldg., Lafayette, La.
Editorial and Printing Office: 4310 W. Fort St., Detroit 9, Michigan

The
AMERICAN JOURNAL
of
MEDICAL TECHNOLOGY

VOLUME 11 MAY, 1945 NUMBER 3

LABORATORY DIAGNOSIS OF FOOD POISONING WITH STUDY OF OUTBREAKS OCCURRING IN LOUISIANA*

By LUCILLE GODELFER, B.A., M.T.

From the Division of Laboratories, Department of Health, State of Louisiana and City of New Orleans (Central Laboratory), New Orleans, La.

Food-poisoning outbreaks are common occurrences throughout the country and with the shortage of food brought about by the war are likely to increase. Food rationing, with the necessity of conserving such supplies as milk, meat, butter, canned food, etc., may prove a two-edged sword. It is of prime importance that we conserve food, but, in so doing, one must be sure that it be free from danger of causing illness or injury because of harmful ingredients.

What are these "harmful ingredients" or scientifically speaking, what are the causes of food poisoning? In the public's mind, the conception of food poisoning is still confused with the old "ptomaine hypothesis." They still believe that the presence in the food of toxic amines or ptomaines that are formed as the result of protein decomposition renders it unfit for human consumption. However, unbelievable as it may seem, the ptomaines in such food, produce no ill effect. Savage[11] showed that foodstuff far too putrid to be

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* *Prize Paper (2nd Award).*

Presented at the Annual Meeting of the American Society of Medical Technologists, June 11, 1944, Chicago, Ill.

consumed by human beings could be fed in enormous amounts to laboratory animals without resulting harmful effects. In fact, some foods such as certain cheeses, "ripe" game and the like, so flavored with ptomaines, are considered a delicacy. Food poisoning, on the other hand, usually results from food which is quite sound in appearance, taste and odor.

According to Dack[4] the causes of food poisoning may be classified into three general groups: (1) chemicals, (2) poisonous plants and animals, (3) bacteria and their products.

In the case of chemical poisons, these may get into food either accidentally or intentionally, and if in sufficient concentration may cause illness or death. Among the more frequent are lead, arsenic, cyanide, fluoride, cadmium, methyl chloride, mercury, etc. These chemicals are often mistaken for articles of food or medicine, taken with suicidal intent or may be maliciously added to food. The white insecticide powder, sodium fluoride, is often mistaken for baking powder, flour, or soda. Arsenic is used as spray on fruits and vegetables and very often a sufficient amount will remain on them to cause gastrointestinal disturbances. Many similar examples might be cited.

Cases due to poisonous plants and animals include some mushrooms, milk sickness, or snake-root poisoning, ergotism, water-hemlock, shellfish and certain birds.

Since the bacterial types of food poisoning are the most common, the organisms responsible for such cases, laboratory procedures for their isolation and identification, and a study of outbreaks caused by them will be more fully discussed.

There are four types of bacteria definitely known to cause food poisoning in man, namely: staphylococci, Salmonella, Clostridium botulinum and streptococci.[18] Outbreaks have been reported due to Bacterium coli and Proteus, but at the present time, proof that these microorganisms are the causative agents is inconclusive.

The increased number of reported cases of food-poisoning outbreaks, in the last few years, is due in a large part to our better understanding of the causes of food poisoning and to the improved laboratory methods of isolation, identification and animal experimentation to determine the pathogenicity of the isolated strains.

The laboratory diagnosis of bacterial food poisoning is gener-

ally dependent upon the public health laboratory. However, any technician with a knowledge of bacteriology, can often be of valuable assistance to the health department in determining the etiological agent. Very often, by the time the health department is notified, all of the food has been destroyed and acute symptoms of the patient subsided. The hospital technician may have received specimens of blood, feces, vomitus or necropsy material from one or more of the patients for routine examination. Therefore, if familiar with laboratory procedure for the isolation of these organisms, may assist in solving many outbreaks. Even if facilities for final identification are not available, cultures of the isolated organisms may be sent to the nearest public health laboratory for further study.

In studying food-poisoning outbreaks, materials collected for bacteriological examination should be placed in sterile containers, packed in ice and brought or shipped to the laboratory as soon as possible. The materials collected should consist of (1) samples of left-over food under suspicion, (2) feces, vomitus and blood samples from the patient, (3) blood and necropsy material from fatal cases, (4) feces and cultures from the nose, throat and skin lesions of food handlers.

I. EXAMINATION OF FOOD SAMPLE

(*A*) *Laboratory Procedure for Salmonella, Staphylococci and Streptococci.*

Laboratory procedure is simple if an outline is developed and followed. The one given in Fig. 1 has proven very satisfactory and efficacious in studying our outbreaks.

1. *Microscopic Examination*:

Make a Gram stain of the material and examine microscopically. This gives an index to the number and kind of bacteria present.

2. *Plating*:

Dip a bent glass rod into a suspension of the material and streak at least two blood agar plates without redipping. Repeat this procedure with two Shigella-Salmonella (SS), bismuth sulfite and MacConkey agar plates. Incubate all plates for 18-24 hours at 37° C.

3. *Enrichment in Liquid Medium*:

Inoculate tubes of dextrose meat infusion broth and tetrathionate broth with a small portion of the sample if solid, or with 1 or 2 ml. if liquid. Incubate for 18-24 hours at 37° C. If the direct plating yields no information, blood agar plates are streaked from the dextrose broth, and SS, bismuth sulfite and MacConkey agar plates from the tetrathionate.

4. *Examination of Plates and Identification of Organisms.*

(a) *Salmonella*:

The SS, bismuth sulfite and MacConkey plates are examined for colonies resembling the Salmonella group. Suspicious colonies are fished to Kliger's medium with the addition of one-tenth per cent sucrose. If presumptive test is positive, proceed to identify the organisms by sugar fermentations, indol reaction, motility, etc., and agglutination tests with specific agglutinating sera. These tests are described in any textbook of bacteriology, and, if final identification cannot be made in the laboratory, a culture of the organism may be sent to the National Salmonella Institute at the University of Kentucky.

Salmonella types most likely to be encountered in food poisoning are Salmonella typhimurium, Salmonella enteritidis and Salmonella choleraesuis. However, the intensive study of the Salmonella group in the past few years has brought to light a large number of other organisms concerned in food-poisoning outbreaks.

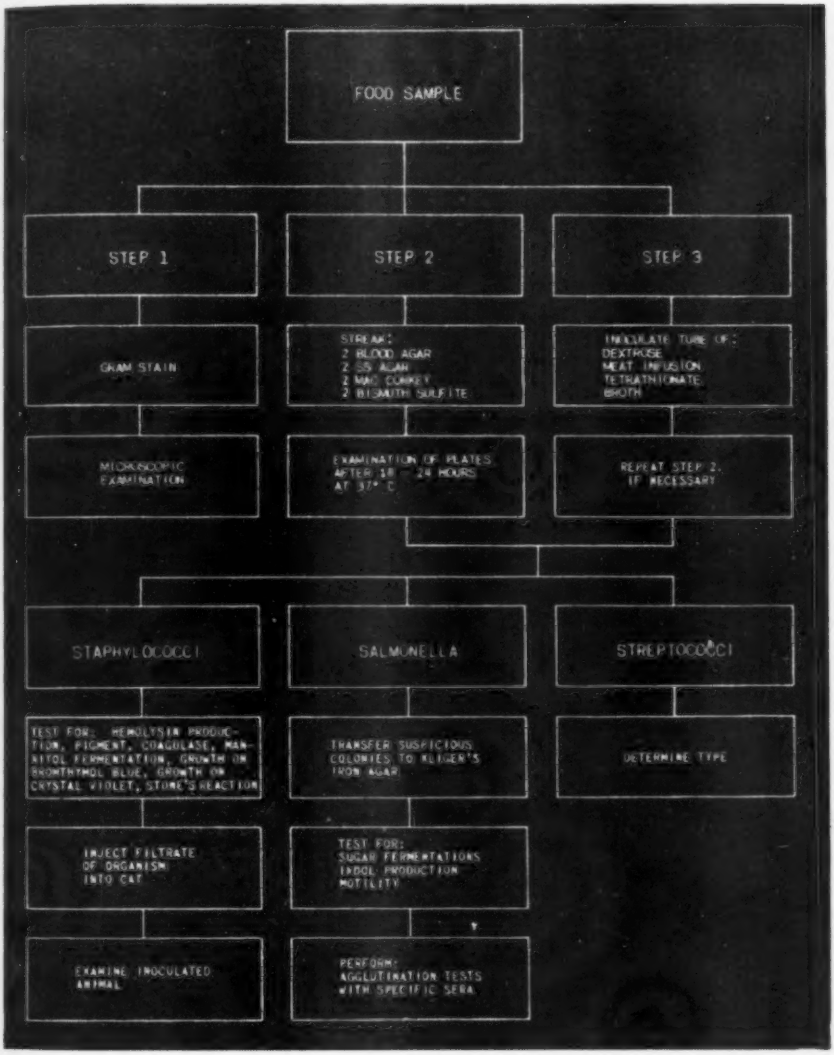
(b) *Staphylococci*:

Examine the blood agar plates for the presence of staphylococci. The preliminary diagnosis depends upon finding these organisms in great numbers on plates streaked from the food. However, no conclusions can be drawn from the finding of these organisms, even in pure culture, because not all strains are capable of producing enterotoxin. No laboratory test has yet been devised to detect the enterotoxin in the food directly. The most reliable means, at the present time, is to determine whether the organism found in the food is capable of producing enterotoxin under experimental conditions by animal inoculation.

Since it is impracticable to study each colony by animal inocula-

FIGURE 1.

OUTLINE OF LABORATORY PROCEDURE FOR
STAPHYLOCOCCUS, SALMONELLA, STREPTOCOCCUS



tion, a rapid presumptive diagnosis of the food-poisoning strains can usually be made by studying certain characteristic properties by special cultural methods.

Transfer several typical colonies from the blood agar plates to agar slants. The isolated strains are tested for liquefaction by Stone's[12] method and for in vitro reactions as suggested and outlined by Chapman, Lieb and Curcio[2].

1. Cultural Studies for Classifying Staphylococci.

Pigment: The culture is plated on Loeffler's Medium and incubated 48 hours. A loopful of the growth is collected and examined in good light. Orange, lemon yellow, yellow and light yellow growths are considered positive; while cream and white growths are considered negative.

Hemolysis: A loopful of the culture is streaked on a plate of rabbit blood agar and incubated overnight. Growths surrounded by wide, or moderately wide, hemolytic zones are considered positive, while those with slight hemolytic zones, or none at all, are considered negative.

Coagulase: A loopful of the culture from solid medium is mixed with 0.5 ml. of fresh, oxalated rabbit plasma. After being shaken thoroughly, the tubes are placed in the incubator and examined at three hours and again overnight. If there is no apparent clot, the tubes are tilted to a horizontal position and examined for a jelly-like mass which can be seen rising slightly above the surface of the fluid or as an opaque disc. Any of these effects are considered positive.

Crystal Violet Agar: A loopful of the culture from agar slant is streaked on a plate of crystal violet agar, and incubated 24 hours. Orange and deep violet colored growths are considered positive; while white, pale violet, or mottled white and violet growths (sometimes with violet borders) are considered negative.

Bromthymol Blue Agar: A loopful of the culture is streaked over the surface of a plate of bromthymol blue agar, and incubated 24 hours. Strains that give luxuriant growth are considered positive, while those producing poor or no growth are considered negative.

Mannitol Fermentation: The culture is spread on a plate of

FIGURE 2.

PETRI DISH
"SPOT" PLANTING FOR ADEQUATE ZONE PRODUCTION

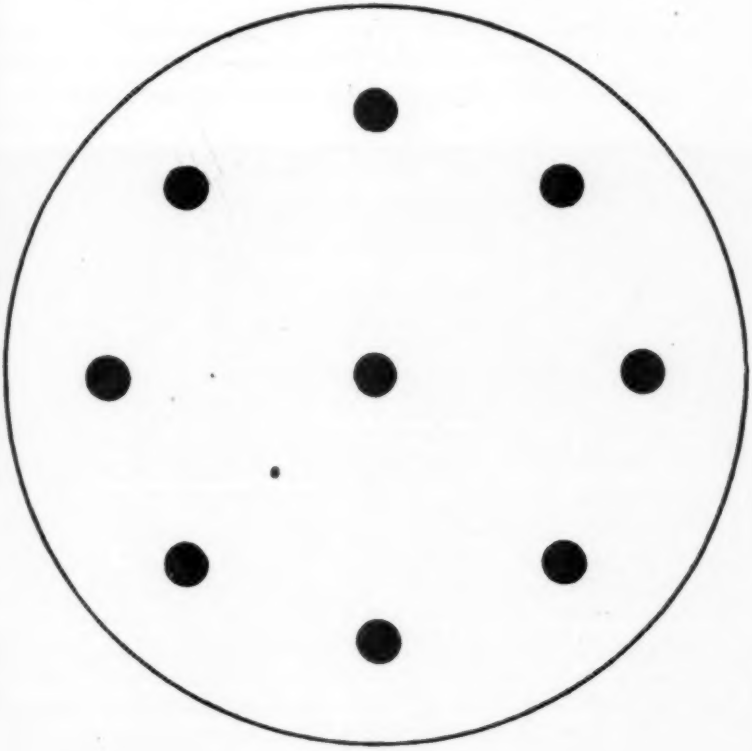


FIGURE 3.

DEGREE OF ZONING

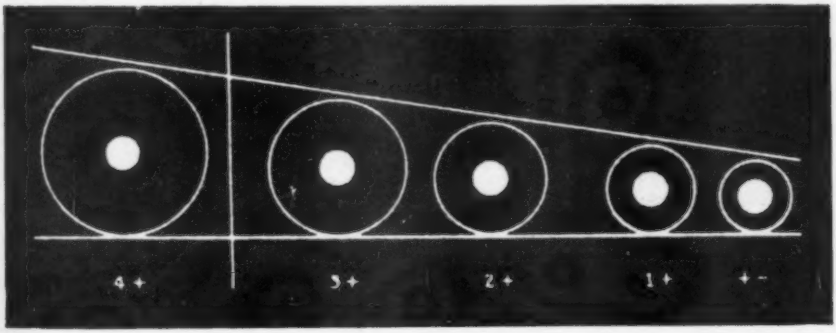
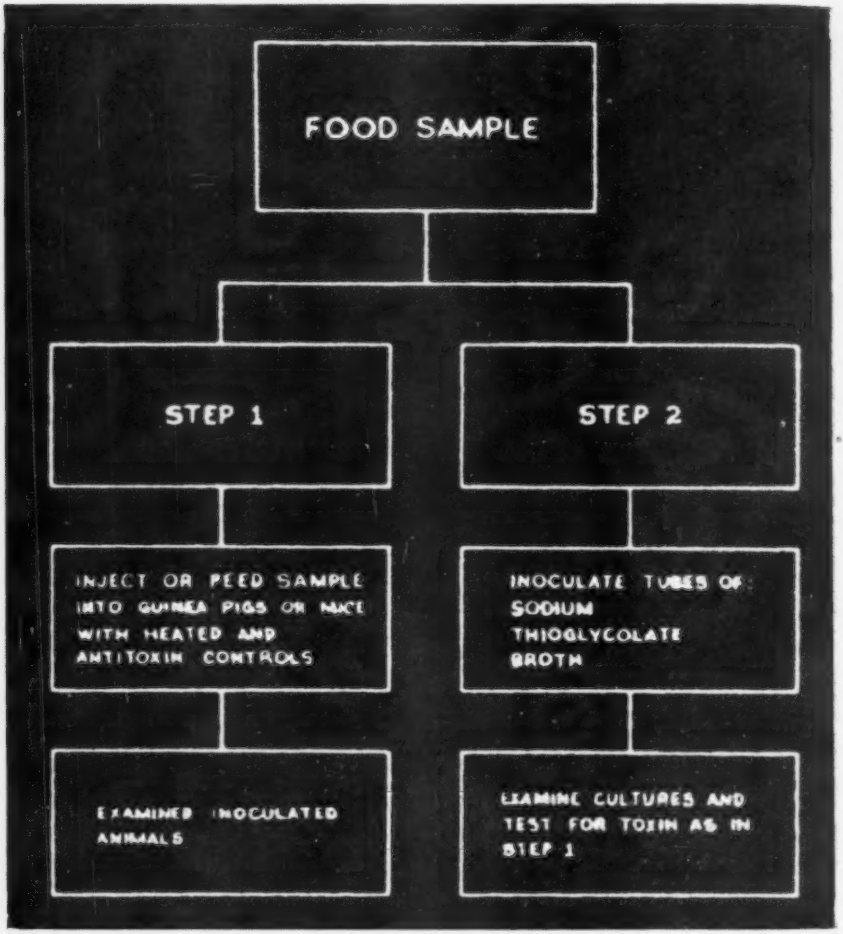


FIGURE 4.

OUTLINE OF LABORATORY PROCEDURE FOR BOTULISM



phenol red mannitol agar and incubate overnight. Colonies surrounded by yellow zones are considered mannitol positive.

The results reported in this order are referred to as "P H C V B M" tests.

Stone's Gelatin Agar: Streak plate of Stone's gelatin agar and incubate at 37°C. for 24 hours. The entire plate is then developed by gently covering it with saturated ammonium sulfate solution. A clearing of the media around the colony is considered positive.

Use the largest zoning pure colony of staphylococcus for subsequent zone classification.

Zone Classification.

On a standard sized petri dish of Stone's agar nine spots can be made per plate if done as illustrated in Fig. 2.

At the end of 24 hours incubation flood plate with ammonium sulfate and place an insert of white cardboard under the dish to classify the zone size as illustrated in Fig. 3.

2. Animal Inoculation Test for Staphylococcus Enterotoxin.

Cultures to be tested are grown on the surface on semi-solid agar in petri dishes. Incubate at 37°C. for 40 hours in an anaerobic jar in an atmosphere of 30 per cent of carbon dioxide.

The cultures are then squeezed through gauze and centrifuged at high speed to remove the agar and most of the bacteria. It is then filtered through a Seitz filter.

The filtrate is heated in a bath of boiling water for 30 minutes. This destroys the alpha and beta toxins (rabbit and sheep cell hemolysins). Inject from 0.5 to 2 ml. of the sample intraperitoneally into six to eight week kittens weighing about 350 to 500 grams or from 0.5 to 5 ml. intravenously into an adult cat.

A characteristic syndrome is produced. Marked lassitude and weakness appears, followed within 15 to 30 minutes, by a series of paroxysms of vomiting and diarrhea. However, Hammon[8] says "a healthy cat, given a meal shortly before inoculation, should react by actually vomiting before any test is considered positive."

(c) *Streptococci:*

Examine plates for alpha type streptococci. The finding of these organisms in large number indicates the possibility of an etiological

agent. At the present time, there are no laboratory methods or satisfactory animal tests for distinguishing the strains of streptococci responsible for food poisoning.

B. Laboratory Procedure for Botulism.

Figure 4 gives a schematic arrangement for study of outbreaks suspicious of Cl botulinum.

1. *Test for Botulinum Toxin:*

Inject several guinea pigs or mice subcutaneously with 0.5 to 1 ml. of the material; protect some of the animals with antitoxins for types A and B, and inject at least one animal with a sample of heated material to serve as control. If animals are fed, larger portions of the samples should be used.

If botulism toxin is present in large amounts the animals may die within a few hours. The survival of the animal injected with antitoxin determines the type present.

2. *Enrichment in Culture Medium:*

Inoculate 3 tubes of sodium thioglycollate medium with samples and heat two of the tubes to 80°C. for 20 to 30 minutes to destroy vegetative form. Incubate anaerobically for 3 to 4 days at 37°C. Examine for the presence of Gram positive bacilli, and, if present test for the presence of toxin as described under 1.

The isolation of the causative organism from food sample in the "infection" types (Salmonella or Streptococci) or the demonstration of toxin in the "toxin" types (Staphylococcus or Botulism) is the most reliable means of solving any outbreak of food poisoning. However, if all of the food has been destroyed, or contaminated, or if one desires to gain additional confirmation, then the following materials are examined.

II. Examination of Feces, Vomitus, Blood.

1. *Feces and Vomitus:*

In Salmonella outbreaks, the organism can frequently be isolated from the feces or vomitus of the patient. Laboratory examination follows any standard procedure for isolation of enteric organisms from feces.

The finding of staphylococci or streptococci in stool specimens

from patients suffering from food poisoning has no clinical significance. The finding of these organisms in the vomitus is of some value, but one cannot always rely upon such evidence because of the ubiquitousness of these organisms.

In the case of botulism, the organisms may sometimes be isolated from the patient's feces or vomitus.

2. Blood:

Blood specimens collected from patients are only of diagnostic value in Salmonella infections or botulism.

Agglutination tests can be made on sera of patients recovering from Salmonella infection. However, this method of diagnosis is not as accurate as the isolation of the organisms from the food or feces.

In patients that recover from botulism, antitoxin corresponding to the type of organism may sometimes be demonstrated in the serum.

III. Examination of Necropsy Material.

If such material is available following acute gastrointestinal illness which might have been caused by an Salmonella infection, cultures can be made from the contents of the colon, spleen and mesenteric lymph nodes. Positive cultures, definitely identified as Salmonella, may be of value in solving an outbreak.

In cases of botulism, toxin can sometimes be demonstrated in the blood, bowel contents, or liver, by animal injection. It is necessary to centrifuge or filter the bowel contents to get rid of the numerous bacteria which are present.

IV. Examination of Feces and Cultures from Food Handlers.

In addition to determining the etiological agent in food-poisoning outbreaks, the laboratory must also assist in the control and prevention of future outbreaks. This may sometimes be accomplished by laboratory examinations of feces, nose, throat and skin cultures from lesions of food handlers.

The Division of Laboratories of the Department of Health, State of Louisiana and City of New Orleans, has had the opportunity to study many outbreaks of food poisoning. Table 1 shows the total

number of outbreaks, the foods involved and the incriminating organism in the outbreaks studied in the past three years.

TABLE 1.

STUDY OF FOOD POISONING OUTBREAKS

1940 — 1943

Number of Outbreaks	Foods	Incriminating Organism
14	Cream or Custard filled pastry	Hemolytic Staphylococcus aureus
10	Meat or Products of meat	Hemolytic Staphylococcus aureus
2	Dairy Products	Hemolytic Staphylococcus aureus Staphylococcus albus
2	Potato Salad	Hemolytic Staphylococcus aureus
1	Chicken Salad	S. typhimurium
1	Turkey Sandwich	S. typhimurium
1	Ice Cream	S. typhimurium
1	Pork Sausage	S. berta
Total Number 32		

It will be noted from Table 1 that 87.5 per cent of our outbreaks were due to enterotoxin producing staphylococci, 96.4 per cent of which were hemolytic Staphylococcus aureus. When one realizes the ubiquity of staphylococci, the variety of foodstuffs in which the

enterotoxin is known to have been elaborated, the high incidence of this type of food poisoning is understandable. It will be noted that the ability to produce enterotoxin is not limited to any particular strain of staphylococcus but the majority of our outbreaks, as well as those reported by other workers, was caused by hemolytic Staphylococcus aureus. It is fortunate, that the ability to produce enterotoxin is not a common property of all staphylococci, but is evidently restricted to a comparative few strains, or even a higher incidence of food poisoning would occur.

It seems unusual that no laboratory test has yet been devised for differentiating the food-poisoning strains of staphylococci from those isolated from other sources. However, we must realize that the recognition of these organisms as a cause of food poisoning is of recent origin.

In 1914 Barber[1] reported an outbreak of food poisoning resulting from the consumption of cow's milk. Staphylococcus albus was demonstrated as the causative agent. Yet, the significance of staphylococci as a source of food poisoning was not realized until 1930 when Dack[5] and his colleagues reported an outbreak due to cream filled layer cake contaminated with hemolytic Staphylococcus aureus. They were able to produce typical symptoms of food poisoning by feeding sterile broth filtrates of this strain to human volunteers.

Of the various attempts, since that time, to devise a relative simple diagnostic test for assaying the enterotoxin produced by certain strains of staphylococci, the kitten test of Dolman, Wilson and Cockroft[7] has proven the most satisfactory. Later Davison, Dack and Cary[6] have shown that the intravenous injection of filtrates into adult cats is satisfactory. Mature cats are more easily obtained, handled and inoculated and the same animal can be used three or four times before developing a tolerance.

The cultural method devised by Stone[12] for classifying staphylococci of the food-poisoning type by gelatin liquefaction has not been confirmed by other workers. Chinn[3] found that 70.6% of the strains he tested from infectious origin gave a positive reaction, while 60.9% of the food-poisoning strains were positive.

Chapman, Lieb and Curcio[2] in studying the in vitro reactions of food-poisoning strains also included various other strains in their

studies. They found that most pathogenic staphylococci not associated with food poisoning outbreaks also give positive P H C V B M reactions. However, they concluded that "a food-poisoning staphylococcus cannot be differentiated from pathogenic staphylococci by this combination of tests alone, but if a strain or variant does not react positively to all six tests, it is unlikely to be the parent strain causing the food-poisoning outbreak."

Table 2 gives the results of the cultural characteristics of six strains of pathogenic staphylococci studied by us. These strains were isolated from employees of bakeries following two major outbreaks of food-poisoning in which the enterotoxin producing staphylococcus was isolated from creamed confections.

TABLE 2.

STUDY OF STRAINS OF STAPHYLOCOCCI ISOLATED FROM NOSE, THROAT AND SKIN LESIONS

Source	Stone's Reaction	In Vitro Tests P H C V B M	Dolman Kitten Test
Throat	0	0 0 0 0 0 0	0
Throat	0	0 0 0 0 0 0	0
Throat	0	0 0 0 0 0 0	0
Nose	0	0 0 0 0 0 0	0
Lesion from Finger	4 +	+ + + + + +	Positive
Lesion from Wrist	4 +	+ + + + + +	Positive

Since the strains isolated from a pustular lesion on the finger in one case, and from a lesion on the wrist in the other possess characteristics similar to food-poisoning strains, it seemed evident that the outbreaks had been caused by contamination from these sources.

Three of the four Salmonella outbreaks were due to S.typhimurium. There is nothing unusual about this as this organism has

been found in more food-poisoning outbreaks than any other species of Salmonella.

The outbreak due to S.berta is quite unusual and of scientific interest since this organism had not previously been reported as a cause of food poisoning.

Hormaeche, Peluffo and Salsamendi[9] isolated this organism from the mesenteric glands of normal pigs in Montevedio. They were convinced after studying its biochemical properties and agglutination reactions, that they were dealing with a species of the Salmonella group. However, they could not include it in any known type because of its antigenic composition.

Kaufman[10] studied the strain and accepted the formula proposed by Hormaeche as S.berta, IX, XII, fgt.

The outbreak of food poisoning due to S.berta studied by us occurred amongst a group of individuals, after eating pork sausage. This sausage was a home made product prepared in another state and shipped to an individual in our state. An organism belonging to the Salmonella group was isolated from several cultures made from the remaining sausage. The same organism was also isolated from stool specimens collected from the patients during the acute stages of the illness. Blood specimens collected about two weeks after recovery, showed agglutins for the organism.

This organism gave the following biochemical reactions:

Acid and Gas from: dextrose, mannitol, maltose, dulcitol, rhammose, sorbitol, arabinose, xylose, trehalose.

No action from: lactose. sucrose, adonite, inositol, salicin.

Simmons Citrate Agar: POSITIVE.

Phenol Red Tartrate Agar: POSITIVE.

Gelatin: No liquefaction.

No H_2S produced.

Indol not formed.

It gave positive agglutination reactions with enteritidis serum but since its biochemical reactions were not identical with those of S.enteritidis, a culture of the organism was sent to the National Salmonella Institute and it was classified by them as S.berta.

In comparing the antigenic formula of S.enteritidis IX, XII,

g.m. with that of S.berta IX, XII, fgt. it can readily be seen why it agglutinated with S.enteritidis serum.

Hormaeche, Salsamendi and Peluffo[9] showed that experimentally, S.berta was pathogenic for the rat and rabbit. However, they state that "until now we have only found S.berta in a normal pig, we cannot then affirm the spontaneous pathogenic action of this type for the pig or man."

Investigation of the hogs used in the manufacture of the sausage by the U. S. Bureau of Animal Industry disclosed nothing to indicate that any of the hogs were imported, but, on the contrary, that they were domestic stock. It will be interesting to note if any further outbreaks of food poisoning will occur from this organism or whether it will be isolated from domestic animals.

In our experience, we have never encountered any outbreaks due to streptococci or Cl.botulinum. No outbreaks of botulism has been reported from commercially canned foods in the United States since 1925. Unfortunately, we cannot say the same for home canned products, especially vegetables. With the increase of home canning brought on by the war, the possibility of outbreaks of this type is likely to increase. Laboratory workers should be cognizant of this possibility.

The application of the results obtained by the study of food-poisoning outbreaks from a clinical, and epidemiological standpoint has lessened the burden of the laboratory work. An efficient health officer who understands the etiology and epidemiology of food-poisoning outbreaks does not collect samples indiscriminately, but concentrates on those most likely to be responsible. He also records other pertinent facts, such as period of incubation, symptoms, number of individuals affected, etc., and then presents this information to the laboratory when submitting samples for examination.

From a clinical standpoint, we now know that staphylococcus food poisoning differs from that of the Salmonella type in that the incubation period ranges from ½-8 hours after consumption, while that of Salmonella is 6-24 hours. In staphylococci poisoning the acute stage lasts only 6-8 hours with the temperature usually normal while in Salmonella type the acute stage lasts longer and is usually accompanied by chills and fever. In the former the recovery is

rapid and complete, usually in about 24 hours while in the Salmonella type it is several days. Botulism generally gives rise to symptoms which are chiefly neurological. From several hours to eight days after ingestion, weakness, headache, dizziness and constipation occur. Nausea, vomiting and diarrhea are rare. Later manifestations are difficulty in swallowing, diplopia, dimness of vision, incoordination, aphonia, dyspnea and paralysis of respiratory muscles.

Epidemiological studies have shown that certain foods may be considered "vulnerable" when contamination occurs. In Salmonella infections fresh meat, fish, poultry, milk, milk products and made up dishes are most frequently involved. The foods associated with staphylococci outbreaks are milk, custard pie, cream-filled éclairs and tarts, chocolate éclairs, custard-filled doughnuts, meat and meat products, especially ham. Botulism generally results from canned products especially home canned foods.

Let us emphasize again that the laboratory plays the major role in solving food-poisoning outbreaks. The presumptive diagnosis is primarily clinical. Detailed study of cases and the particular food causing an outbreak is epidemiological. Collection of suspected foods and search for evidence pointing to the source of infection is the duty of the sanitary engineer. Yet, the final diagnosis of food poisoning in all instances is in the laboratory.

Summary

1. Food-poisoning outbreaks are common occurrences throughout the country.
2. Outbreaks may be caused by (1) chemicals, (2) poisonous plants or animals or (3) bacteria or their products.
3. Laboratory procedures for isolation, identification and animal experimentation of the bacteria which are responsible for food-poisoning outbreaks.
4. Study of organisms responsible for bacterial outbreaks occurring in Louisiana during 1940-1943.
5. Cultural characteristics of S.berta, an organism isolated from pork sausage causing one of the outbreaks.
6. Clinical and epidemiological studies of food-poisoning outbreaks

as applied to the laboratory.

7. Major role played by laboratory in solving food-poisoning outbreaks.

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THE CIVILIAN MEDICAL TECHNOLOGIST'S PLACE OF SERVICE IN THE ARMY HOSPITAL

By CORA LOUISE MILLER, M.T.
A.A.F. Regional Hospital, Langley Field, Va.

We few civilians, who were offered civil service jobs in 1942, as specialists in our line, in Army Hospitals, were strictly G. I., "Government Issue." The enlisted men did not want us. We were looked on with suspicion and dislike. They were sure we did not know how to do laboratory work the army way and it must be done the army way. Each enlisted man thought he would be sent directly overseas because his place was being taken by a civilian. It took loads of tact and adaptability to adjust oneself to these adverse conditions, to stick it out and not to become so obnoxious to the enlisted men as to be shipped out. For one rule in the army hospital is, a civilian has to get along and work with army personnel, for if there is friction, every question is decided against the civilian. The civilian is the one to leave. The army personnel has to carry on.

Our duties were to carry on the laboratory work smoothly while our laboratory men were on K.P., special detail, personal examination, signing of pay roll, physical training, special classes and while the men were being shifted from one assignment to another.

For an experienced medical technologist, this was not too hard an assignment. At first the men were so jealous of their various duties that the civilian was only allowed to do the hated jobs. The men were sure that with the coming of the civilian, there would be no more chance of a rise in rank.

There was no one in our laboratory who could use the typewriter. I did not want to use it either, but I had done secretarial work at one time, so I started in to type daily reports, water reports and premarital blanks. We kept ten to fifteen premarital forms of various states, so as to accommodate the men on the field. After the Kahns were done, my big job was typing premarital forms and keeping a book record and permanent files of the serologies. I also

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* *Presented at the Annual Meeting of the American Society of Medical Technologists, June 11, 1944, Chicago, Ill.*

was permitted to order material from the medical supply, once weekly. This was a job especially hated by the men and it was quite necessary to keep supplies on hand. I was glad of the opportunity to learn the "paper work" of the army laboratory. These small jobs would not interfere with the men's chance of promotion. But as one man would fall out for class, physical training or on special detail, I would keep his work going. When one was on furlough or pass, I would automatically take over his work. In that way, I learned what they thought was army technique, proved of service, and won the approval of the men. As the men were shifted from field to field, new men were sent to us. The laboratory work increased. I was able to work into my rightful place in the laboratory.

Our laboratory occupies one-half of the first floor of a large red brick building, which is the out-patient clinic. An end and one side of the building faces water, which is almost a mile wide. The water is a small arm of Cheasapeake Bay. We have fine hand-rubbed oak tables, cabinets with soapstone sinks and soapstone table tops. The laboratory is lighted with fluorescent lighting. The still, autoclave and hot air oven, are in a separate room so as not to add to the natural heat of summer in southern Virginia.

We have excellent equipment: large hot air oven, good horizontal autoclave, huge electric bacteriological oven, large centrifuge with multiple trunnions, centrifuging one hundred and sixty sera at one swing, Kahn shaker, three microscopes (one binocular) and a Duboscq colorimeter. I have been able to instruct and caution the laboratory men in the care and use of all of this valuable equipment.

The civilian must be able to adjust herself to the wishes of different men as laboratory officers. This was especially hard for me for I had formerly had just one chief in eleven years. The laboratory officer takes the place of the pathologist in the civilian hospital. I have had seven different laboratory officers in the eighteen months I have been at Langley Field. Most of these men have had special training in laboratory work. None have been pathologists. All have had special liking for laboratory work. One had a Master's degree in dairy administration, the other six were M. D.'s. Two were lieutenants, four were captains, the other was a major. One was a pediatrician, another an O.B. man, a city police doctor, a specialist in diabetes and two general practitioners.

There were nine men and a sergeant in the laboratory at the base hospital, when I arrived in November, 1942. The men were assigned to special work, three men doing blood counts, three urinalyses, two venu punctures and Kahns and one bacteriology. The laboratory work consisted mainly of counts, urinalyses, typings, an occasional blood sugar, and milk bacteriologies.

As soon as the medical officers knew there was a civilian technician in the laboratory, they began to order B.U.N.'s, blood chlorides, sugar tolerances, sulfa determinations, cholesterols, blood alcohols, uric acids, phosphorus, calciums and others. The men were glad to turn this work over to me and I was overjoyed to do it. Ever since, I've been setting up practically all new procedures. I am very careful to show the men the proper technique, cautioning them against the difficulties and pitfalls, so they can profit by my years of experience.

If a large group of men, fifty to seventy, come to the laboratory for blood groupings, a team of four men will take over. We use anti A & B powdered blood grouping sera. One man will prepare test tubes with 1 cc of physiological saline, another lines up the slides with A & B grouping powder on each. One man would use a spring lancet putting a drop of blood in a tube of saline which is passed with patient's name on slip to second man, who uses medicine dropper, placing drop of cell suspension on each small amount of anti A & B powder. Third man stirs drops with piece of applicator and places slide on slip, on which is written patient's name. Fourth man, after five minutes, reads the group, using microscope. The sergeant then will give each waiting soldier his slip back with his blood group designated in Landsteiner grouping initials.

When I first went to Langley Field, all but two of the men in the laboratory were Walter Reed trained. They had had three months of practical work and lectures and possessed a very good working knowledge of laboratory technique. We soon lost four of these men to officer's training corps. Two went out to other fields as technicians. One was given an officer's appointment. We then got new men trained in a general hospital in the West. These men had very little practical work. Their training was mainly with lectures and theory. They had a good speaking knowledge of laboratory technology. With about a month's practical work doing counts,

urinalyses and venu punctures, they were able to carry on and take over the responsibility of "Emergency" at night, which is "on call" in the army.

Each cadre that went out from Langley Field carried one or two laboratory men. We soon found it necessary to train men sent to us. Most of these men had expressed a liking for hospital work.

We have had one pharmacist, one Hercules Powder Co. foreman, an ichthyologist, an undertaker, several premedical college students, an electrician, a carpenter, a truck driver, a shipping clerk in a pharmaceutical house, a color chemist in a textile factory, a man who said he was a neuropath and a newspaper reporter. All of these men have made very good technicians. I know of none who wish to be technicians after the war. This is a point we medical technologists will appreciate.

We start them in on urinalyses, just taking specific gravities, then albumins and sugars. We slowly work them in on microscopics. There is constant activity in this part of the work. All physical examinations, done by the flight surgeon, contain a urinalysis. Entrance examinations for all A.A.F. cadet schools, officer's training, gunnery and bombardier schools, officer appointment, applications for warrant officers, flight officers, combat duty, on returning from combat, civil service and army insurance get a urinalysis. Most of these examinations require a Kahn. Too, all officers on the field receive several physicals each year.

After working on urinalyses, for about a week, we have the new man accompany the technician out on the wards to collect counts. They then practice using a spring lancet and fill W.B.C. and R.B.C. pipettes. Soon they do a count on themselves, then on a friend. We check their counts. When we are convinced they are able to fill the pipettes accurately, fill the counting chamber and count the red and white cells, we let them take one on an out patient. We next instruct them in the various white cells of the differential. They are soon able to name the different white cells and do an acceptable differential. They are also shown how to do a thick smear and examine for malarial parasites.

Venu punctures are next on the curriculum. The men I have trained have been very easy to break in on venu punctures. We have mostly patients in perfect health on which to do venu punctures. If the patient is very sick, a woman or heavy negro maid,

they call on me for help. The men are proud of their venu punctures and enjoy doing them. We have had two men who refused to do them, so we just got along without them in that department. When the new man is doing venu punctures, he is taught how to set up a sedimentation and read it. We do many sedimentation rates.

Kahns are next on the program for the new man. He starts centrifuging the sera, arranging Kahn tubes and managing the shaker. Soon he is learning to pipette sera. After quite a while at these simpler procedures, he is allowed to pipette the antigen. We do about one hundred Kahns every other day. We have very many premarital ones.

Next the new man is shown how to stroke a plate, do stained smears and read them, take a blood culture, do Gram and Ziehl-Neelson stains.

Last of all, he is shown how to do blood sugars and B.U.N.'s. He looks in on blood phosphones, calcium, chlorides, cholesterols, prothrombins, Hanger flocculations, uric acids, total proteins, salicylate acids and blood alcohols.

He is also taught to do blood groupings and set up a cross matching.

We have a very large O.B. and pediatric clinic, often forty patients in an afternoon. Practically all receive urinalyses, others Kahns and counts. The laboratory men generally ask me to do the laboratory work on the children, but they enjoy doing the work on the women out patients. We are now doing all the O.B. work from two other army camps in our section.

There is a large eye clinic and one for ear, nose and throat. We do venous clotting, counts, urinalyses and Kahns on all pre-operative patients for this clinic and numerous smears and cultures.

We do all out patient work for a huge sub depot plant on the field. Most of these are civilians. They come in at all times of the day for counts, urinalyses, smears and Kahns.

The sanitary department sends us water from all points on the field for plate counts and presumptive tests for colon aerogenes group. Also we examine water for maneuver fields back in the state.

We examine milk, ice cream and butter for veterinary department. Also, sometime, special bacteriological work on sick dogs

and cats. After a special pet cat of one of the officers had died, the vet. lieutenant in charge asked us to rule out bubonic plague.

The post examiner sends all food handlers in service clubs, P. X.'s, mess halls, maids in officers' homes and janitors every sixty days to us to have urinalyses and Kahns done.

We have two hospitals on the field, the base A.A.F. regional station hospital and a cantonment type hospital, we call the new hospital, which is three miles distant. The base hospital is for surgical cases and the new hospital for medical ones. At our hospital, the base hospital, we do all B.M.R. examinations, prepare all media, make all reagents for quantitative procedures and wash and dry all glassware for both hospitals. We possess the only autoclave and hot air oven for the two laboratories. We do the unusual chemistries and bacteriologies for both hospitals.

Our tissues are sent to a general hospital for sectioning. A microtome and a knife have been ordered, so we might be cutting tissues soon.

The V.D. clinic is at the new hospital. The men do many uretheral smears and dark field examinations. We are doing many G.C. cultures, using Peizer medium. This is a very rich medium devised by a technician in the New York public health laboratory. The G.C. colonies are tiny and clear on primary incubation in a candle jar, but on transplanting these colonies have quite a tinge of blue, from the Nile blue A, which is used to inhibit contaminants.

We have a small research project on hand. We are endeavoring to find out the sulfo-resistant strains of G.C. before time is wasted in treating the patient with the drug. This project is well on its way. I fear this study will be of little value for we are already treating most G.C. infections with penicillin.

For quite some time, we have been fortunate to obtain penicillin for a number of different infections. It has been gratifying to watch the cultures grow negative and the patient's white count go down. We have had the daily job of diluting this drug with sterile saline and keeping a constant supply on hand for the patient.

The bookkeeping of the army hospital laboratory is quite simple. There are separate printed blanks of different colors for all the different kinds of work: Serology, blood counts, Bl. chemistries, gastrics, feces, basals, sugar tolerances, urinalyses and a miscel-

laneous blank to cover any other work needed. These are filled out in duplicate by the officer making the request. When the work is done, one is sent to the officer and the duplicate kept in the laboratory. These duplicates are kept on file for six months.

We keep a daily report of procedures. It is not required but so often we are asked for the number of tests done for several months, that we keep a daily report in order to save us trouble.

Our laboratory force now consists of a captain, a sergeant, two Pfc's, two privates and two civilian technicians at the base laboratory. A sergeant, three corporals and two privates in the laboratory of the new hospital. We also have a colored Pfc. to wash glassware. The two hospitals have a total of about 500 beds. During April we did 4,975 procedures.

Being a hospital of an air field, one would expect many crash emergencies. Several of our laboratory men are members of the crash crew and go by ambulance or boat to help at these accidents. The work is so well organized that only the crash of several planes involving quite a number of men, creates much excitement.

We got our hospital and laboratory ready to receive injured after a bad explosion in a nearby city and also sent many ambulances fully manned with men, nurses and doctors to the site. The men helped with the injured and looked after the dead but did not need to bring any injured to our hospital.

We feel that the civilian medical technologist has profited much by her experience in the army hospital

1. By learning simplified army procedures.
2. By learning to adapt oneself to the many wishes of a number of different laboratory chiefs.
3. By being conscious of the ability to train personnel unfamiliar with medical work in laboratory technique so that, with close supervision we are able to do acceptable work.

We feel that we have used our skill, training and experience in many ways to help our country in its time of need

1. By setting up practically all new procedures in the laboratory.
2. Relieving men when away from the laboratory on military duties on the base.
3. Keeping the work running smoothly when laboratory personnel are being transferred off the post and new men coming in.
4. Training enlisted personnel in laboratory technology.
5. By supervising all laboratory procedures.
6. By being able, with the aid of a few men, whom we have trained, to lend scientific aid in the examination diagnosis and treatment of men in the army, their dependents and the many civilian employees on the army base.

MEDICAL TECHNOLOGISTS AND THE POSTWAR MEDICAL WORLD

By PATRICIA (Jonkus) DEPNER, M.T.
34-59—89th Street, Jackson Heights, Long Island, New York

Back in 1933, I was a High School graduate. Ours was known as the depression class. This was part of a poem I wrote:

Oh these psychologists, sociologists, judges, doctors, and deans!
Congressmen, politicians, Joneses, Smiths, and Greens!
They all say this, they all say that
There just isn't any room for me!
But out of the past comes a ray of hope,
A teacher saying to me,
"There's always room for a good one!"

Well, at least we hope so. Today, to be a medical technologist, or not to be a medical technologist is indeed a question. Coming before a group of similarly trained people gives one a most comforting feeling. Makes one wriggle her toes as if slipping into old, comfy slippers. It is as relaxing as it is exciting. We are here to be constructive,—to share knowledge,—to improve,—to go forward. I, alas, am here to speak for the M. T. who *has* to have a job in order to live. Yes, any angle from which it may be approached may be boiled down to dollars and cents; but at present, I am more interested in the angles themselves. I am here to be constructive, to go forward. This is a commentary rather than a scientific report. Arthur Koestler, writing in the *New York Times*, declared that those who write of things as they actually see them, and refuse to pull their punches because the material they report on might offend some or seem too extreme to be believed, are called "screamers." I feel that I can be classed as a screamer. I believe I can sum my scream thusly:

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* *Presented at the Annual Meeting of the American Society of Medical Technologists, June 11, 1944, Chicago, Ill.*

What is this you do to Science, which you profess to cherish?
After giving birth to this gem of a profession,
You clutch its throat after its first full gasp of being?
And bear it down into the darkness of complete forgetting?
Like a Mr. Hyde, you stifle a thing of loveliness
With the terrifying, ugly, brutal strength of indifference?

Isn't that a macabre picture, though? This isn't for those of you who feel no sense of recognition. If you have a position as an M. T. which offers security, technical as well as financial, and a certain amount of prestige to give you a psychic income as well, I implore you to continue in your present capacity so that your place of employment may be pointed out as exemplary. In the meantime, it won't hurt to hear about less fortunate technicians; and to dwell upon the future of Medical Technology in general.

I shall make believe I'm on a high school auditorium platform. The principal introduces me as someone active in the field of a budding, profoundly interesting profession. I begin: "Ladies and Gentlemen: I am a nationally registered medical technologist." Then I'd go into all but double-talk about chemistry, biology, zoology, bacteriology; watching their eyes open, bulge, and gleam at words like serology, histology, hematology, parasitology, electrocardiagraph, photo-electric colorimeter, and basal metabolism. Nowadays, many a ten-year-old knows about his haemoglobin. I'd go on to tell we work on blood samples—(thinking to myself meanwhile, better let them find out about urinalyses, stools, etc., later). Even now a laugh escapes me as I recall an older trained technician, now socially prominent, who was kind and good enough to help me out, saying, "If my maid had even the slightest notion of what *kind* of work I'm doing!" On that particular afternoon, we were searching through ten jars of stools brought in by imaginative parents. It was hot; it was ultra humid; we had closed the door to the hall with a sign, "Closed for one half hour." In no time at all, the laboratory was reported for closing during hours. Comments flew about such as: "It would be nice if we could all put out a sign, but the phones seem to ring just the same!" With the door open, we were always being chided by the constant stream of would-be patients, the office, or the

medical staff for permitting such odors to escape. "Didn't we know some people are definitely affected by such?" My mind skips to the irate father, who having brought a specimen in a diaper, demanded that the diaper be washed and returned to him immediately. My eyes again see a sea of students' faces. Suddenly I have to keep tight hold so as not to really burst out as I recall one wife holding on to her husband as she witnesses that he present a specimen directly into my hands after she has had me properly identified; with her eyes boring into mine, she orders its proper examination. Innumerable technicians have passed through that laboratory. That is the place run by the people for the people. All this passes within seconds of time. Perhaps I'd go on musing. The principal may have to touch my arm to get me back in the groove—perhaps he'd be a modern person who'd say, "Get hep!" Well, high school students would understand about plasma because of the war. I'd dramatically tell them how a plasma bank was set up in hospitals in which I worked. I'd mean every word I'd tell them. My own eyes would begin to sparkle with enthusiasm. Sincerity would pout into a sentence or two on working specimens from the O. R. adding, as if sharing a secret, "that's what we call the operating room." Of course, I'd describe immunology mentioning rabbits, guinea pigs, and mice. I'd also stress the study of as much bacteriology as they could get. It *is* interesting—fascinating—wonderful. I breathe the last. Interesting sums it most accurately. Yes, it is interesting. During this entire time, I'd want to look over the faces and into the eyes of these young men and women. One can't call them youngsters—not these educated high school boys and girls of today—they're keen; they're alert; they're practical; they've been in a world at war! A greater percent are beginning after having already seen sorrow too deep for tears. And so, I'd say, "God forgive me. God bless them." I'd search for the idealistic faces and I'd pray, "Break their hearts a little—that would be all right—but don't, please don't break their spirits!"

Well, I might have them buffaloed with some terminology. I could just hope not to have questions asked or encouraged from the floor. I'd have them all write down the address of the Registry, murmuring, "Now it's *your* baby."

Finally, I know I'd break down and offer to answer any questions in the little room off stage—or they should feel free to call me. My conclusion would be, "Don't let me scare you with terminology nor with guinea pigs nor with mice. Remember that what one fool can do—so can another. Here are three preliminary rules to follow in any line. Please remember them:

1. Be sure of your health. Have a complete physical check-up.
2. Be sure of proper financial backing.
3. Recognize your capacities. Acknowledge your limitations.

It is because of possible questions and the way I would answer them that I've never gone before a high school group. Most certainly, I could talk around each question. Chances are that a student who would come to see such a speaker personally is definitely interested. On my conscience, I could not paint a convincing picture with any great detail. I recall, now, when Dr. Adams Dutcher of The Penna. State College Bio-Chem. School went by in the halls, and said in passing, "Just don't count on making a living with it." He had said it two or three times when I thought, "What's the matter with that guy?" Now I know he was doing his duty by his conscience. He was protecting us as best he could in those days of very few jobs indeed. Hence, I could not earnestly and glowingly say, "Yes, I would do it all over again." And "Advantages? Chances for advancement? My dear, they are endless." Most certainly, I would advocate getting a degree towards a possible medical career. I believe an M. T. should have that background. Personally, a major in bacteriology would be first choice. Inevitably, there would be at least one earnest person determined to borrow and to work his or her way through. I'd have to discourage boys entirely. How could he ever expect to pay off a debt in even an unreasonable length of time and even think of a future? His best girl would undoubtedly say, "For gosh sakes, if you're doing all *that* why don't you go on and be a doctor?" Yes, because financial success is at least possible in the medical doctor's world. May a word be added that I think medical technology is a field for men as well as women? For putting medical technology so far down on the scale of professions most likely to succeed, I deplore the fact that hospitals with their policy

of living in are as much to blame as the small, commercial-minded schools for laboratory technique and the doctors' offices where girls are employed with experience for remuneration. Hence, in answer to chances for advancement I'd most likely say, "Pick the highest salaried position you can find." Go to it, and "Remember This" by F. Collis Wildman:

"Be good, but not too good—a little naughty, but not too naughty. Say a prayer if you feel that way—say 'damn' if it gives you consolation.

Be kind to the world always, if possible—Yet if you must be unkind, smash right and left, get it over and forget it.

Smile, always smile—have a smile ready even tho' sometimes it hurts.

Grab all the happiness you can—don't let even a wee bit slip past you. Live, above all things live—don't simply exist.

If you are blessed enough to know what real love is—love with all your heart, soul and body.

Live your life so that at any hour you will be able to shake hands with yourself and try to accomplish at least one thing worth while each day. Then when your nights come, you will be able to pull up the covers and say to yourself, 'I have done my best'."

If I should meet up with a counterpart of myself I'd hand her an envelope with instructions to open it on the eve of her first job. I don't know the author of this one:

"If you put your nose to the grindstone rough,
And hold it down there long enough,
These three will all your world compose,
Just you, the stone, and your silly old nose!"

I wouldn't be able to tell them that college is a big build-up for a big let-down. They'd resent me just as I resented the various speakers who stressed how one should be almost superhuman to tackle medical school. I looked upon being on call every other night as being exactly what I wanted. I was not alone. I am not alone. Doesn't everyone like and long to be needed? I didn't, at first, know

what it's like to go like a power-house for an indefinite number of hours, to miss meals, and to be so often unnecessarily called after you have hit your pillow. I wish to stress the word unnecessary. Need I go on? One can laugh after one is no longer so dreadfully tired. Shall I start the ball rolling? How about the time the man went to a movie first, and at 11 p.m. had the technician called to take the W.B.C. ordered that afternoon? And the time, after waiting an hour for the patient, she walks in at midnight to be followed later by the doctor, who ordered several W.B.C.'s before he would accept the original? And another count order was found in the a.m. to be done stat? And how about the time a pneumococcus typing was ordered on the same patient two nights in a row, and the type on being found and called in was answered with, "But that's the same as it was yesterday!" There was the time when everything was finished for the day. We were praying because it was a gorgeous evening in early June. Stat orders for two sedimentation rates arrived. I took my courage in both my hands—and merely wasted precious time. I had the doctor located. With cajoling sweetness, I asked if the requests could possibly wait until the a.m. I was met with a bellowing, "Do you mean to tell me you've had me called in off my horse to ask me that? What do you think I ordered them for? Don't you think I like being out in the air?" I, with spirit, answered that that was exactly what I wanted to do—to get out into the air! My spirit had as yet been unshaken. Need I add that because someone was present, the laboratory did not close until 11 p.m.? This might be a good spot to quote a wonderful woman I know. I was telling her that I had once said to an interne, "And I had always looked upon doctors as gods!" He had answered with conviction in his tone:

"You must go on thinking that. Doctors *are* gods!"

My good friend said, "Nurses may be trained with that idea stressed; technicians are in a position to question."

Yes, happiness is a state of mind; but isn't continued fatigue without proper rest periods toxic? There was the job with a dream-come-true laboratory. It was a honey! Here was the first laboratory with all the equipment hoped for and more to come. I was willing

to work 24 hours out of the day. Many times I worked 18 to 20. Did they have to take me seriously? There were plenty of windows, but the laboratory, in the summer, was almost unbearably hot. I didn't mind. And no matter that the pathologist left for the army when I so wanted to work for a full time pathologist. I mentioned the heat because I want to tell you about the living conditions I had there.

My room was as cold and as damp as can be opposite for contrast. I was taken aside and instructed never to associate with the student nurses. I had just arrived; I was older than the oldest student could be for entrance. At the end of the day, I was to find that my bathroom was the official classroom bathroom and wash room for the entire day. It takes only one untidy person to make a mess of a bathroom. Room to lab; lab to room. I was glad to have so much to do. I learned, much later, that I had been hired because I knew how to do tissues. After three months I turned out slides that even I liked; I had dusted and put into use the photo-electric colorimeter; I strove to enlarge our variety of blood chemistries; I made solutions; I struggled with bacteriology so that at least what we did do would be of the best. This laboratory even had a centrifuge especially designed for plasma; we had a plasma bank. From a work angle, I was exactly what the doctor in charge had ordered. One day, after classes had been organized, I walked into the dining room at noon. On each table was a sign designating in large print who was to sit where. I had been enjoying any seat near a window. The grounds were beautiful. The supervisors, house physician, anaesthetist, physiotherapist, superintendent, instructors, and dietician dined in a separate little dining room across the hall. The office staff had a larger table in a sunny corner of the main dining room. One smaller table supported a sign reading "Laundry and Lab". Later that day, a few of the student nurses came in timidly to ask very hesitantly, "Miss Jonkus, j-just wh-what *is* a lab. technician?" I was hurt where I was concerned; but I was incensed because the so-called laundry was really the house-keeper, with whom I most frequently ate lunch anyway, and whose company was most refined and enjoyable. When I now entered the dining room, for breakfast and for the evening meal, if I entered at all for the latter, the grad-

uate nurses looked carefully away if they were seated alone or if I were. Eventually, I caught a heavy, summer cold. I am convinced that it was only because of my health that I was given a nice, little room in the separate house where the supervisors and anaesthetist lived. Yes, the superintendent really wanted me to be happy. She was rushed; she was harried; any help was so very hard to get; she was a truly wonderful woman; I left at a very bad time indeed. The fact still remains, however, that this laboratory had a supervising doctor in a downtown office; the superintendent was terrifically busy downstairs in her office; and both had the board with which to contend. Never forget there is always a board! Well, when it came A.S.M.T. convention time, I learned it couldn't be considered because the other technician's feelings might be hurt since she was not eligible to go. And I had marveled at the progressive atmosphere there! Still later I was to learn that if I were to live outside the grounds, I couldn't ever expect any more salary than the other technician was receiving. I was receiving $90/mo. plus maintenance. The other received $100/mo. plus any maintenance desired. She was not registered; she not only did not know how to do the work I was doing, but she refused to try to learn. The greatest mistake I have made on all my jobs was in using poor judgment on the amount of work one person can accomplish. I was anything my co-workers may choose to call me—over-zealous, over-conscientious, over-ambitious. Adverse as it may sound, I had no desire to force other people to do as I did; but I did object to their constant contention, their calling me a fool. No, no employer ever wanted me to quit. Neither did any of the employers of technicians I met on my travels want them to leave. Yes, it will all take time; but where are we to find a great enough number of people who will tolerate subservience until the better conditions arrive? I don't refer to attitude; I mean physical stamina cries out, too. Understand, please, I have agreed on many occasion that my co-workers were absolutely right. My employers instructed me to do exactly as I did. Discord reigned.

I've had occasion to swap yarns with other registered med. techs. One M.T. tried a couple of positions after her interneship. She returned to her alma mater for graduate work. She was a "natural" to become advisor for the outcoming technicians. She sent everyone

of an entire class into chemistry fields open in the government telling them they'd be better off in the long run. She, herself, is a brilliant student and longs to do the work for which she is well trained. Not since my first position in Utica, N. Y., have I met a single technician in favor of the Registry. I have had one recruit. She is a woman trained twenty-five years ago. She passed the exam. with flying colors. Every younger, far more recently trained person asks, "What has the Registry done for you?" I have pleaded, in vain, and with absolute futility, that we can but progress if there is unity and standards. I have cried out, "How else can they know how in earnest is our plight if they have nothing in their files on the subject?" I pleaded that they at least join the A.S.M.T. and try to attend a convention. They were adamant. It isn't the Registry, but the jobs that have driven them away. However, they look to the Registry to bring them back.

It is at this morbid point that I'll give you a poem I jotted one night in the wee hours as I stained tissues undisturbed:

NaCN
Clever, swift, vicious stuff!
Potent, sure-fire, crystal stuff!
Just one pinch would be enough.
NaCN
Snug under a tight, black cap,
Glistenin' thru its glassy wrap,
Waiting for my nerves to snap.
NaCN
High on a cupboard shelf,
Taunting my lesser self,
Tempting my better self.
NaCN
Neither conquered, all is well;
You're there, I'm here, who can tell
When I wandered into Hell?

I had four positions in five years. On none of them did I work with a registered medical technologist except for two short periods of two months and two weeks respectively when two tried the job

and decided they couldn't tolerate the hours, etc. I was terribly sorry to see them go. Why are registered technicians preferable? You and I know it is because they are *similarly* as well as *well* trained. What a pity that it does not follow that they utilize their training. There is a wealth of material in just that statement. Why can't the jobs as well as the technicians be weeded out? Why can't the Registry be our clearing house? Since there is a recognized shortage of M.T.s, why can't they be distributed among the positions requiring their specific and special training?

If any of you have been gypsies as I have been, I believe you will agree that you found each lab., each set-up, each set of institutional rules unique in itself. Many procedures are followed because of precedent. May I here pay tribute to my teacher, Roman Zorensky? To me he was Prof. Z. As he demonstrated a technique, he never failed to say, "Remember, this is not the only way to do this; it is just the way I do it." Never again did I work with someone as open-minded. I have yet to meet his equal as a medical technologist, and that includes a very great deal.

And now, to enlarge upon the subject of precedent and similar training. On one job, an N. Y. A. girl cleaned syringes and needles on instruction from the technician in charge. There was a large supply of them. They were boiled in a sterilizer; set out to cool at a window which was never free of soot; were dried with a clean, but unsterile towel; and then one syringe plus a needle, after being tested on a finger for roughness, were wrapped together in a square of clean, unsterile, coarse gauze. The needle, more often than not, protruded bevel end out of the gauze. A white hospital tray was used to carry the syringes and needles which had been unwrapped, tested for blockage, and laid ready for use in a row on the tray. Used, unwashed syringes with needles rolled side by side with the "clean" ones. The N. Y. A. girl fished them out of bloody water where they were left to soak. She wore no gloves, and no antiseptic was used. This is one of many instances. Naturally, I protested. A shrug and a vehement, "I've never had any trouble," were words I was to hear many times from not a few technicians and would-be technicians; for this method and others were passed on and used. I get weary with just thinking of the incidents. If proper authority

were given people with proper training, this problem of people working in harmony would be at least tackled instead of left as an obstacle.

One more incident on precedent. I suppose we all do some routine agglutination or precipitin reaction test on sera of prospective donors. One hospital was using a test with which I am very familiar. The antigen, prepared for use, was two months old. It was kept on ice. There were only a few drops left in the bottom of a centrifuge tube when it was given to me to use. There was no antigen on hand for me to make up a fresh suspension. I had caused much furor. They had always done it that way. The serologist came the next day to inform me that Dr. so-and-so had personally told him that in his own laboratory the antigen is used thusly, and that only would-be or inexperienced technicians are given precise instructions. I was berated and humiliated before the entire laboratory. (And I had attended conventions!) From thence, all registered M.T.s were more or less on trial. The pathologist in charge is a brilliant man. He is an excellent and an eager teacher. However, he had no time for me when, as a registered M.T. I was unable to enter his laboratory and immediately set it to rights. I had not used aeration for Blood Urea Nitrogens since college; every bottle I picked up was emptied of reagents; chemistry glassware was piled high unwashed; culture media was unlabeled in the ice box; when glassware was washed, only tap water was used. Maybe that is permissible. I no longer know where technique should begin or end. I do know they were having troubles with chemistries. I do know the pathologist preferred training his own technicians. I do know he was against a straight salary of $150/month. May I suggest that the pathologist, making a widely used antigen, let us *all* in on these time saving techniques? Professor Z. always said, "Do things so that no one can criticize you!"

Yes, technicians wished to accomplish in ten years what nurses accomplished in one hundred years. May I point out the progress made in a short time by the Airline Pilots' Association of America, International? Are not pilots pioneers? The reputation of an association can be comparable to the mentality of its members. I do not mean to say that it should follow that technicians should have rul-

ings similar to those of the A.L.P.A. Their rulings are made suitable for them; but they are protective to the last item.

Every association that wields any kind of power for its members (the A.L.P.A. for example), has one member devoted exclusively to campaigning and fighting for you all the time; not seasonally or weekly, but all the time. His journeys are as wires from a central switchboard.

If the Registry won't be our central unit, why are not M.T.s automatically sent into A.S.M.T.? Then again it is asked, "Why do we need two central units?" Does the Registry wish to retain its power of authority and, at the same time, maintain the right of never exercising it? To be able to write a brighter picture, we must have someone who can and will fight for us; someone who can and will spend his or her whole time campaigning for the Registry. That means a full salaried, full time job for a crusader. He would have to visit state departments of health and present our case in person; he would have to visit doctors and hospital boards and argue with them. It would be hard work, and a trying job. In return for better working conditions and pay for technicians he would offer a standard of work that every technician must measure up to; and that standard is high enough to make it advantageous to hire a Registered technician instead of just a "technician".

One more thought. There are less than twenty-five airlines in this country, with some of the larger ones employing hundreds of pilots. Hence, one Association member can bargain for hundreds of his fellow members. Each airline is treated as a separate problem and handled as such when drawing up contracts; hospital and doctors employ technicians by one and twos—are there fifty anywhere? Therein lies a bargaining weakness but by no means a fatal one. The Registry can be sold to employers on quality of work alone.

Where does all this lead us? Even the Army couldn't use us—or wouldn't use us is more accurate. Each time we had occasion to do a venal puncture on an Army officer he had this to say, "Oh, but Walter Reed Hospital could use you!" We heard of many incidents. We went twice a week to take blood samples for serology tests from

inductees. In a few months, Corporals were sent to replace us. We taught them, then washed syringes and boiled needles. 'Twas our contribution to the war effort. And so enough of the Army.

Any job I have attempted since I left my last permanent station in order to join my husband, has not materialized because of our temporary status. One pathologist would have been willing to use my services; but would not pay someone to learn his routine and system in order to carry it off to another lab. He does have an exemplary set-up.

Hospitals and laboratories may claim to the Registry that they can't afford higher salaries, etc. Again I lay claim to precedent ruling. Hospitalization plans such as the Blue Cross Plan have been a boon to hospital trade. The only job I found that offered a progressive future was one giving birth to socialized medicine. I was to have regular hours and a steady though small increase in salary. Here is another infant still wrapped in its placenta bawling for release. I wish to go on record as saying that I believe the public mind is not ready for "group" medicine, and that the doctors are more prepared for it than is the public. I found that to be true from practical experience while the opposite is generally believed to be true. It is a bargain and the public treats it as such.

Could it be they look upon it as a contract between medicine and the people? Well, it's grown to be medicine versus the people. This is the place where mothers call Pediatrics to ask how hot to heat the babies' soup; is it warm enough to take a baby out? and out of 100 calls, fifty must be, "What's my child's haemoglobin?" The nurse in pediatrics and the woman at the appointment desk develop telephonitis. The turnover is terrific. Woe unto all when a member, with great wrath, demands his rights—and their rights are so many I've termed Group Health, "The Medical Nightmare." They demand a smile and a sweet word in return for whatever they offer be it an open scowl or a complaint to the medical director. These complaints range from a technician's not liking my tone of voice when help is so hard to get to someone's not getting a physical check-up just on general principles when he never felt better in his life. These are no exaggerations. They are an infinitisemal crumb for the tast-

ing. The *Reader's Digest* printed an article by Paul de Kruif on the tick. The laboratory was deluged with insects for immediate examination—and the bearer must look into the 'scope, too, to be convinced. (Anybody know their bugs?) Breaths were held when Gene Tunney's article on G.C. came out. There were persons, believing themselves to have been exposed, who demanded immediate attention. There was much ado because the doctor requested was out to lunch and was booked solid for several days. Oh, yes, the people were seen; the lab. ran out of G.C. culture plates and was accosted for not being able to prepare more "stat". Too often, persons without sufficient knowledge attempted to run the lab. from making appointments to buying equipment. The B.M.R. machine was over-scheduled to the extent that it broke down when it had a life time guarantee; and that with total disregard of the technician's repeated requests for the utilization of the machine for only those needing the test. Many and similar incidents were a daily occurrence with the result that many technicians came and went. Nurses as well as doctors were in similar predicament. Nothing tackled; nothing solved. Long will the buck be passed! Socialized medicine may be the answer to the people's needs; but it does not yet even approach the medical person's Utopia. It is indeed the people's loss, for the plan is idealistic. Here is a brief resumé from the literature put out by Group Health Association, Incorporated, of Washington, D. C.

G.H.A., Inc., was established in 1937 as a Federal employees' medical cooperative. It is a cooperatively administered, non-profit institution. Each of the members own a share in the organization. It is democratic; the members elect their own trustees from among themselves. Management policies, including the employment of the staff and the supervision of fiscal operations, are administered under the direction of the Board of Trustees. Membership is open to Federal employees in the Washington area. The Association started with less than 900 members. In January, 1942, it had a membership of 3,300 and was providing services for 7,800 individuals, including dependents. The medical staff includes 13 full time doctors, one optometrist, 8 registered nurses, 2 lab. technicians, one X-ray technician, and 2 graduate pharmacists. On the staff, in addition to

general practitioners, are specialists in surgery, pediatrics, obstetrics, internal medicine, urology, and eye, ear, nose, and throat.

A membership fee of $10.00 is paid by each new member, A member who leaves the territory served by Group Health or who resigns after two years may transfer his membership certificate to another new member. Monthly dues consist of $2.00 for a member, $2.00 for wife, husband or other adult dependent, and $1.00 for each of the first three children under twenty-one years of age—no charge for additional child dependents.

Each person covered is eligible to receive hospitalization for 21 days for any one illness or accident, with a maximum of 42 days in any calendar year. This includes a semi-private room, general nursing, use of the operating or delivery room, services of the anaesthetist, dressings, ordinary medication, routine laboratory examinations, nursery care, emergency room facilities, and ambulance.

For the first home call in any illness $1.00 is charged if the call is within an airline radius of 8 miles from the clinic, or $2.00 if it is within a radius of 8 to 15 miles. No charge is made for other house calls necessary in the same illness.

The general idea is to practice preventative medicine.

In conclusion, may I say a happy medium could be what we're all searching for. I've had my scream. May I leave you with this for my summary:

A pilot writes of skies and the elements,
We write of slides and eliminates.
They have the sun, the moon and the stars;
We have T.B., G.C., precipitates.

When we breathe with rapturous sigh,
Say they, "Anybody can fly!"
'Tho they manage to find men enough,
Do they let anybody fly?

S. O. S. means Slow on Signals,
R. O. C. means Rough on Controls,
"Your Schneider's too low," is the last word,
There's no list'nin' for whom the bell tolls.

Focused just above a tiny lamp,
We gaze down into fields of wonder,
Just the right pressure made this smear.
Can *Any*body give a B. M. R.?

R. O. C. could mean Rough on Counts,
S. O. S. could mean Slow on Smile,
C. B. C. could mean y-o-u!
Should your chart, too, be on file?

ABSTRACTS

PENICILLIUM ANTIBIOTIC IN THE TREATMENT OF INTRINSIC ALLERGIES: P. Schonwald and E. F. Deppe, Northwest Med., vol. 44, No. 1, Jan., '45, p. 10.

Allergies of this type are considered to be due to causes within the body, probably to bacterial sensitivity. Reasons for this view are the fact that environmental control does not eliminate the allergen, complete remissions do not occur, and the fact that some of these allergies are improved by vaccine therapy. Usually removal of the focus is not possible. Desensitation has been found better.

Considerable relief of symptoms was positive in the 11 cases here presented by the use of crude and later, commercial, penicillin. Several patients became symptom free.

SENSITIVITY OF VARIOUS SEROLOGICAL (LANCEFIELD) GROUPS OF STREPTOCOCCI TO PENICILLIN: R. F. Watson, Proc. Soc. Exp. Biol. & Med., vol. 57, No. 1, Oct., '44, p. 65.

Penicillin dilutions were prepared in broth and to each was added an amount of suspension containing 1,000 to 10,000 streptococci. These were incubated at 37°C. for 15-18 hrs. Subcultures then made on blood agar were incubated overnight. The highest dilution completely inhibiting growth was used as the end point.

Strains within a group showed very little variation. The size of inoculum could be varied greatly without changing the penicillin required to inhibit.

In groups A-N (except D) an inoculum of 1,000-10,000 cells could be sterilized by 0.0039 to 0.0625 Oxford units. Group D required 2.0 to 5.0 units. Since it is difficult to maintain concentrations greater than 1 Oxford unit per cc. blood, it is not likely that group D would respond favorably. The others should be easily treated.

HEMOGLOBIN CONCENTRATIONS, RED CELL COUNTS AND ERYTHROCYTE VOLUMES OF COLLEGE WOMEN OF THE NORTH CENTRAL STATES: M. A. Ohlson, D. Cederquist, E. G. Donelson, R. M. Leverton, G. K. Lewis, W. A. Himwich and M. S. Reynolds, Am. Jr. Physiol., vol. 142, No. 5, Dec., '44, p. 727.

This paper is based on data obtained on 4,550 women from 6 states. These were college students from 16-30 yrs. of age. The mean Hgb. concentration was 13.4 g. per 100 cc. blood, mean erythrocyte count 4,560,000 per cmm., and mean cell volume 40.0.

CHRONIC MENINGOCOCCAEMIA: J. Lane, Med. Jr. Australia, vol. II, No. 24, Dec., '44, p. 617.

This is a case report of a man admitted with the provisional diagnosis of acute rheumatism. WBC 28,000 with 84% polys. Sedimentation rate 48 mm. in one hour. At 48 hr. intervals he had pyrexial episodes. A blood culture taken during the third of these showed Meningococci. Spinal puncture showed fluid with a cell count of 600 per cmm. with 54% polys. Meningococci were cultured from this as well as from the throat. Administration of sulfanilamide gave toxic effects and was discontinued. The patient recovered. This case is unusual in that the patient never showed signs of meningitis.

PROTEOLYSED LIVER IN THE TREATMENT OF REFRACTORY ANAEMIAS: L. J. Davis and L. S. P. Davidson, Quart. Jr. Med., vol. XIII, No. 50-51, Apr.-Jul., '44, p. 53.

Proteolysed liver used was a papain digest of whole liver prepared for oral administration. This was effective in the treatment of refractory anaemias with megaloblastic sternal marrows. Five cases were restored to normal health.

Three cases of macrocytic anemia in which the sternal marrow was of a "dimorphic" nature were clinically improved and showed partial blood regeneration.

Five cases of aplastic anemia with hypocellular normoblastic bone marrow failed to respond to this or any other treatment.

It is suggested that proteolysed liver contains an available form of hematopoietic maturation factor in addition to the anti-anaemic factor in liver extracts.

STATE AND LOCAL SOCIETIES

Louisiana

The Louisiana State Society of Medical Technologists was organized last November, the organizing members being 11 in number. The membership now totals 63 out of the approximately 150 registered Medical Technologists in the state. The first annual meeting of the society was held in New Orleans on April 14 and 15. We were very fortunate in having Doctor Lall G. Montgomery as the guest speaker. His paper was on the Registry and was both interesting and pertinent. There were five interesting papers by technologists and a symposium on parasitology by Doctor Emma Moss, Director, Department of Pathology, Charity Hospital and Doctor Marion Hood, Assistant Director, Department of Public Health, L.S.U. Medical School. Included in this was a demonstration of cysts and trophozoites of amoeba which was quite instructive. Doctor John G. Arnold, Jr., Chairman of the Departments of Biology and Medical Technology, Loyola University, New Orleans, was the banquet speaker. He served in the Army with the rank of captain, attached to the Sanitary Corps and spent some months on Guadalcanal. Doctor Arnold's paper was titled "Santitation and Medicine in the South Pacific."

A committee was appointed to issue a quarterly newsletter to members of the society.

Minnesota

FRIEDA CLAUSSEN VISITS DULUTH

As announced early in the year plans were under way to have Miss Frieda H. Claussen visit the Arrowhead Region and pep up medical technologists to a consciousness of organization, organization locally, statewide, and nationally. These plans were accomplished when on the afternoon of Saturday, March 3, 1945, Miss Claussen was honored at a formal tea by the students registered in medical technology at the College of St. Scholastica, Duluth; attended the business meeting of the Arrowhead Society of Medical

Technologists which followed immediately after the tea; and then addressed an assembly of pathologists, laboratory directors, graduates in medical technology and students. Her theme was: "The Responsibilities of a Career Girl."

In part she said: "Medical technology uses in a most primitive way the three guide posts to success: to learn and apply; to teach; and, to share. What profession can give us greater opportunities for constantly learning medical technology. So many jobs are humdrum, mechanical, and one-track. No chance to change or improve. Medical technology needs constant study, reading, attendance at lectures, and the help of specialists and research workers. We could not stand still if we tried.

"To teach: Teaching is a part of every one's job in life. Many girls chose medical technology to escape teaching. We cannot escape it for whether we are training a substitute for our job or bringing up the career-girl-in-the-embryo . . . we are teaching. To share: whether you have heard it at a lecture or read it in a journal, or stumbled on it by accident, or found it out by hours of painstaking research, share it. Let the other fellow have the benefit.

"The advantage of membership in medical technology societies lies in an: 1. Opportunity of seeing and receiving journals with articles written by you and for you; 2. Opportunity of attending meetings and lectures and of learning and sharing the endless stimulating discoveries that are made. These two are only a small part of what these societies do for us. Steadily, silently, and unswervingly they work for our future good. They stand ready to work out your problem for you. One never knows when one is going to be in a position where he will need the backing of these organizations. One never knows what one's future problems will be. Membership gives you standing and prestige."

Miss Claussen closed by summarizing in statistical fashion the enrollment of the state and national society. There has been a steady growth.

In Minnesota a financial challenge was passed from the medical technologists of the north of the state to those of the south and it is that for every dollar the northern group earn for the state treasury the southern has to earn $3. This proposition is on pro capita basis.

Oklahoma

Mr. Oscar Stewart, M.T. (ASCP), President of the Oklahoma Society of Medical Technologists writes, "We in Oklahoma are putting on a campaign for new members to the American Society of Medical Technologists. Since last fall the membership of the Oklahoma Society of Medical Technologists has increased considerably. By the time of the next Convention of the A. S. M. T. we hope to have 50% of our members joined to the American Society of Medical Technologists."

PARASITOLOGY LOAN SETS

The Board of Registry has found it necessary to request a deposit of twenty-five dollars ($25.00) from pathologists and technologists wishing to use the parasitological slides. The three dollar ($3.00) service charge will be deducted and the remainder refunded when the set of slides is returned to the Registry office.

A number of pathologists have requested these slides recently, but because of the limited amount of material it is not always possible to send them when requested. Every effort is made to comply when possible. Requests should be sent to:

THE REGISTRY OF MEDICAL TECHNOLOGISTS
of the
AMERICAN SOCIETY OF CLINICAL PATHOLOGISTS
Ball Memorial Hospital
Muncie, Indiana

Name of State or Local Society	A.S.M.T. Affiliation	Meetings	Secretary's address
Caddo Parish Society of M. T. 1944-'45 Pres.—Eola Kendrick	non-aff.	monthly	Harriet Cypert, M.T. 179½ Fremont Street Shreveport 67, La.
California Association of M. L. T. (Santa Barbara Chapter) 1943-'44 Pres.—Grace P. Butera	non-aff.	monthly	Florence Connelly, M.T. 317 West Pueblo Str. Santa Barbara, Calif.
Chicago Society of M. T. 1944-'45 Pres.—Dorothy Laestar	aff.	monthly	Ada Meloy, M.T. 1575 Florence Ave. Evanston, Ill.
Colorado Society of M. T. 1944-'45 Pres.—Mabel O. Stewart	aff.	monthly	Annalee Breslford, M.T. 1560 High Street Denver, Colorado
District of Columbia Society of M. T. 1943-'44 Pres.—Zanerian E. Funk	aff.	monthly	Evelyn F. Ballou, M.T. 4105 Third Street N. W. Washington, D. C.
Illinois Society of Clinical L. T. 1944-'45 Pres.—Fannie Warnock	aff.	semi-ann.	Edna H. Murmann, M.T. 3924 N. Monticello Ave. Chicago, Ill.
Indiana State Society of M. T. 1944-'45 Pres.—Virginia Sue Alley	aff.	annual	Hazel M. Childs, M.T. Indianapolis City Hosp. Indianapolis, Ind.
Indianapolis Society of M. T 1944-'45 Pres.—Nila Maze	aff.	monthly	Ruth Trotter, M.T. 615 East Dr., Woodford P Indianapolis, Ind.
Inland Empire Society of M. T. 1943-'44 Pres.—Frances Premo	non-aff.	annual	Lenore De Vor East 547 Gordon Spokane, Wash.
Little Rock Society of M. T. 1943-'44 Pres.—Marcella Drilling	non-aff.	quart.	Lila Church 2116 Orange Street Little Rock, Ark.
Minnesota Society of M. T. 1944-'45 Pres.—Mr. Chauncey Winbigler	aff.	annual	Thelma Erickson, M.T. 1211 East 4th Street St. Paul 6, Minn.
Nebraska Society of M. T. 1943-'44 Pres.—Romona Forbes	aff.	annual	Marjorie Lundeen, M.T. Lincoln General Hospital Lincoln, Nebraska
New Hampshire Society of M. T. 1943-'44 Pres.—Sister Marie-Rose (Larivee)	non-aff.	annual	Marion P. MacMartin, M.T. Mary Hitchcock Mem. Ho Hanover, N. H.
Niagara Frontier Association of M. T. 1943-'44 Pres.—Wilma Riehle	aff.	monthly	Mrs. Angela Auer, M.T. 16 Duerstein Ave. Buffalo, N. Y.

Name of State or Local Society	A.S.M.T. Affiliation	Meetings	Secretary's address
Ohio Society of M. T. (Akron) 1943-'44 Pres.—Kathryn Teeple	aff.	annual	Mary Benedict Clark, M.T. Nichols General Hosp. Louisville, Ky.
Ohio Society of Clinical L. T. Dist. #1 1944 Pres.—Jean Jones	non-aff.	semi-ann.	Patricia Nelan, M.T. c/o City Hospital Akron, Ohio
Oklahoma Society of M. T. 1944 Pres.—Oscar Stewart, M.T.	aff.	semi-ann.	Hazel Clay, M.T. (ASCP) c/o University Hospital Oklahoma City, Oklahoma
Oklahoma City Society of M. T. Pres.—Vernal Johnson, M.T.	non-aff.	monthly	Kay Hutcherson c/o St. Anthony Hospital Oklahoma City, Oklahoma
Omaha-Council Bluffs Society of M. T. 1943-'44 Pres.—Kathern Belle Forest	non-aff.	bi-mo.	Josephine Benal, M.T. City Health Dept. City Hall, Omaha, Nebr.
Pennsylvania Society of M. T. 1944-'45 Pres.—Ellen Marie McDevitt	aff.	monthly	Anne Caverly, M.T. 5000 Pulaski Avenue Philadelphia 44, Penna.
Savannah Society of M. T. 1943-'44 Pres.—Sadie Cartwright	aff.	monthly	Jurelle S. Hooper, M.T. 20 East 56th Street Savannah, Ga.
Tulsa Round Table of M. T. 1944 Pres.—Homer L. Spencer, M.T.	non-aff.	monthly	Mrs. Elizabeth Johnson, M.T. 401 Medical Arts Bldg. Tulsa 3, Oklahoma
Wisconsin Association of M. T. 1943-'44 Pres.—Alice A. Thorngate	aff.	semi-ann.	Mrs. Elizabeth Kullman, M.T. 2460 South 59th Street Milwaukee 14, Wisc.
Wisconsin Association of M. T. Milwaukee District, 1943-'44 Pres.—Dorothy Zoeller	non-aff.	monthly	Esther Lemont, M.T. 2618 North Summit Ave. Milwaukee 11, Wisc.

Key: (aff.—affiliated with A. S. M. T.)
(non-aff.—not affiliated with A. S. M. T.)
(semi-ann.—semi-annual)
(bi-mo.—bi-monthly)
(quart.—quarterly meetings)

CECELIA M. KORTUEM, R.N., M.T. (ASCP)
Editorial Staff
American Journal of Medical Technology